telephone service. In other areas of the world the wait is years or more for a phone line, which tends to operate at lower average service quality. Such conditions promote the use of wireless service as an option to fixed line service.

B. A. European and Japanese population densities require more spectrum.

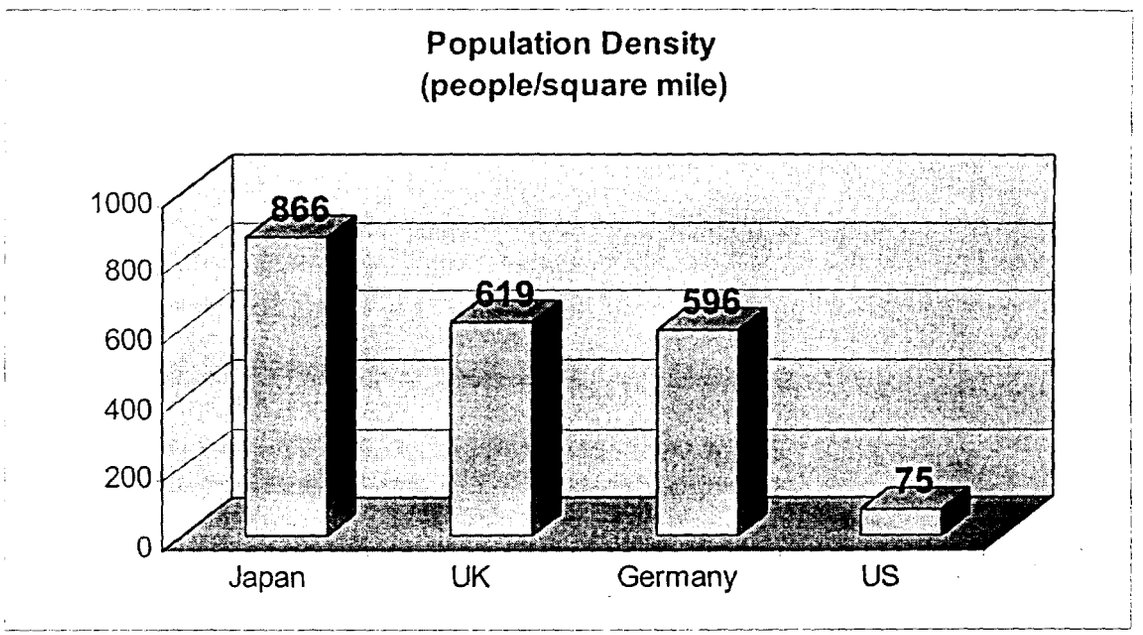
65. As described above, wireless systems are designed around capacity: how much load (minutes of use, or as engineers like to state load, Erlangs) will be generated in a given area. This of course is a function of how many people will place phone calls in a given area at a given time.

66. The key to successful radio network design is capacity planning and interference management. In FDMA (AMPS) and TDMA/GSM systems this takes the form of frequency reuse planning. Essentially, the same frequency is used in different parts of a market, but it is done sufficiently far apart that no interference occurs. This was the fundamental concept developed by Bell Laboratories 40 years ago in the 1960s during the development of cellular radio technology. When the load of a single cell exceeds the capacity, the cell is "split" – it is divided into two or more smaller cells each having the capacity of the original larger cell.

67. In order to accomplish this model of cell splitting and interference management, One has to be able to put the entire load that they'll be getting in the area served by one cell on frequencies that are not being used in adjacent cells. When the load is packed into a dense geographic area, one needs to use many small cells, rather than a few larger cells. The problem is that at some point, cells just can't get any smaller: the signal wants to propagate a certain distance and you can't keep it from doing so. Moreover, densely populated areas tend to have high-rise buildings, which exacerbate the

problem in a number of ways. In high-density areas, then, relatively more spectrum is needed than in low-density areas.

68. Fortunately, areas of high population density are very rare in the United States. The following chart shows the population density of the US compared with Japan, the UK and Germany.



source: Yankee Group

69. Thus, the significantly higher population densities in Europe and Japan require wireless operators there to use relatively more spectrum than they would in the United States. This is not to say that they need as much spectrum as they have, or that they are using their spectrum in the most efficient way possible. This only means that, all other things being equal, wireless coverage of areas (such as Europe and Japan) with greater population density takes more spectrum than coverage of areas (such as the United States) with lower population density.

VIII. Conclusion

70. The US has stood above many nations in business growth due to deliberate steps taken to promote competition. That U.S. engineers developed CDMA radio technology for commercial wireless networks is a perfect example of what comes from intense competition. Leap's Cricket service, a disruptive service for other carriers to try to implement, is also a result of competition, and has brought wireless service to Americans who thought they could never afford it, and at the lowest prices available anywhere in the world. With no spectrum cap in place, we and other entrepreneurial companies like ours would face virtually insurmountable obstacles to our ability to enter the market and provide this service.

71. In my opinion, there is no need for an increase in the amount of spectrum that wireless carriers are permitted to hold; certainly not this year or anytime in the near future. Spectrum is a finite public resource that is indispensable for both existing *and new* wireless companies. There is simply no compelling reason to modify or lift the spectrum cap at this time. Doing so would restrict both present and future competition

72. The fact is that if they choose to, carriers can get by on very little spectrum. Leap now offers our Cricket service that permits users to make unlimited local calls for a single low monthly rate – just like fixed line service; an all-you-can-eat plan. Our *average* customer uses more than a thousand minutes a month. And we have attracted a large number of customers. Yet Leap offers the Cricket service in markets in which we hold as little as 10 MHz of spectrum. We would not know what to do with 45 MHz of spectrum.

73. Some carriers are currently using inefficient technology – analog, TDMA and/or GSM – that wastes the spectrum assets of those carriers. Just by improving their technology, those carriers could increase by many times the effective capacity of their systems. But instead of obtaining more use out of what they have, those carriers would apparently prefer to acquire and put to inefficient use more and more of this scarce resource.

74. Nor can the large carriers claim that they need more spectrum in order to fulfill the demand they speculate will develop for some amorphous concept that they call "3G." It's hard to rebut a notion as vague as the big carriers' "3G" claims. But everything I know about the subject indicates that they're vastly overstating what they will need. On the one hand, wireless data simply does not and will not require vast amounts of bandwidth. Text applications require much *less* capacity than does voice telephony, and mobile Internet browsing capability has already been achieved using only slightly more the bandwidth (9.6 Kbps) than is consumed by two simultaneous phone calls (4.0 Kbps each). Moreover, the next generation of wireless equipment will (just as did every previous generation) offer far more capacity. Thus, any increase in capacity that is required by 3G wireless applications will be offset in large part by the increased efficiency of the same 3G systems. While future streaming video and audio applications will no doubt require more speed and bandwidth than today, it appears that it too will comfortably fit inside 45 MHz or less of spectrum.

75. The cap is so high today at 45 MHz that it is like having an NBA salary cap of a hundred million dollars; so high that each team could afford to hire the "dream team." Yet – to extend the analogy – some teams have chosen to spend their

$100 million by hiring the equivalent of collegiate bench-warmers. And now they're asking the league to raise the salary cap.

76. Any number of analogies come to mind. It's like asking for more public property so that you can continue to build low-rise offices, instead of building skyscrapers on what you already have. It's like asking for more landing slots so that you can run 14-seat propeller aircraft, instead of 747s. It's like ripping up the streets to lay more fiber, instead of increasing the capacity of the signals on both ends. Asking for more spectrum while you continue to use outdated, inefficient equipment is like, well, asking to have your cake and eat it too.

I certify that the forgoing is true and correct, to the best of my knowledge, information, and belief.

Executed in San Diego, California, on April 13, 2001

Mark C. Kelley